



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,585	03/31/2004	William H. Whitted	16113-1322001	8421

26192 7590 04/13/2010
FISH & RICHARDSON P.C.
PO BOX 1022
MINNEAPOLIS, MN 55440-1022

EXAMINER

PAPE, ZACHARY

ART UNIT	PAPER NUMBER
----------	--------------

2835

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

04/13/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATDOCTC@fr.com

Office Action Summary	Application No. 10/816,585	Applicant(s) WHITTED, WILLIAM H.	
	Examiner ZACHARY M. PAPE	Art Unit 2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 February 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-39 and 41-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-39 and 41-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 5/12/2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/23/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 2/23/2010 has been fully considered and is attached hereto.

Claim Objections

2. Claims 34 and 43 are objected to because of the following informalities:

Claim 34, in line 10 recites, "by air cooled through one or more cooling coils" and then in line 19 recites, "one or more cooling coils".

Claim 43, in line 12 recites, "by air cooled through one or more cooling coils" and then in line 15 recites, "one or more cooling coils".

The Examiner respectfully requests that the Applicant's review all the remaining claims for any such similar issues.

Appropriate correction is required.

Response to Arguments

3. Applicant's arguments with respect to the rejection(s) of claim(s) dated 5/12/2009 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made as per below.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 34-36, 38-39, 43-45, 49-50, 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. (US 6,819,563 – hereinafter, “Chu”) in view of in view of Beitelmal et al. (US 2003/10053293 – hereinafter, “Beitelmal”) and further in view of Dearborn et al. (US 2002/0190868 – hereinafter, “Dearborn”).

With respect to claim 34, Chu teaches (In Figs 2, 6a, and 6b) a system for cooling electronic components, comprising: a rack (200 or 600) holding a plurality of computer boards that support heat-generating computer components, the rack having open first and second sides (See Fig 2) that are opposed to each other and are open to circulation of ambient air from a computing workspace during operation of the system so as to permit fluid communication across the computer boards to an exterior of the rack, cooling of the computer components by air cooled through one or more cooling coils (640a-h), and wherein the rack has third and fourth opposed sides between the first and second sides (See Fig 6b), the third and fourth opposed sides not open to circulation of ambient air from the computing workspace; a plurality of air circulation fans (622) adjacent one of the open first or second sides, wherein each of the circulation fans is located near an edge of one of the computer boards and positioned to circulate cooling air across an associated board, wherein the air circulation fans provide cooling air over

Art Unit: 2835

the computer boards, wherein cooling air circulated over a first computer board is separate from cooling air circulated over a second computer board adjacent the first computer board (Each fan produces an airflow exclusive to the board it is adjacent); one or more cooling coils (640a-h) associated with each of the plurality of boards and located near one of the first or second sides of the rack (See Fig 6a, 6b). Chu fails to teach or suggest a fan controller corresponding to each air circulation fan to control the speed of the corresponding fan according to a temperature sensed around a board corresponding to the air circulation fan and that the rack structure is one of a plurality of rack structures arranged to form a pair of rows on each side of a central aisle, the plurality of computer boards accessible through at least one of the open first and second sides through the central aisle. Beitelmal teaches a fan controller(s) (50) corresponding to an air circulation fan(s) (14) to control the speed of the corresponding fan according to a temperature sensed around a board corresponding to the air circulation fan [0031, 0033]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Beitelmal as per above with that of Chu to provide the ability to increase or decrease the flow rate of cooling fluid [0033]. Increasing or decreasing the fluid rate will allow for more efficient cooling of the electronics. With respect to the aisle limitation, Dearborn teaches (In Fig 5) a plurality of rack structures (150a, 150b) arranged to form a pair of rows on each side of a central aisle, a plurality of computer boards accessible through at least one of the open first and second sides through the central aisle (See Fig 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

Art Unit: 2835

combine the teachings of Dearborn with that of Chu, such that there are multiple racks (As the one shown in Chu Fig 11b) located in a pair to form a central aisle and wherein the boards are accessible via the aisle since doing so will, predictably, provide for a single data center with adequate room to maintain and cool the racks.

With respect to claim 35, Chu further teaches one or more cooling coils (640a-h) are positioned immediately adjacent to the plurality of circulation fans (622, see Fig 6b).

With respect to claim 36, Chu in view of Beitelmal and Dearborn further teaches that each rack has associated air fans (622), cooling coils (640a-h), and fan controllers (As per the teachings of Beitelmal), and wherein the pair of rows is arranged on each side of the central aisle (See Dearborn Fig 5), the central aisle disposed lengthwise in a container (I.E. room 140 of Dearborn) that houses the plurality of rack structures, the cooling coils located on sides of the rack structures away from the aisle and near outside walls of the container (It is obvious to place the rack as taught by Chu into an aisle as taught by Dearborn such that the cooling coils are located on sides of the rack structure away from the aisle and near outside walls of the container as claimed).

With respect to claim 38, Chu further teaches a separate cooling coil (640a-h) for each computer in a rack of computers (See Fig 6a).

With respect to claim 39, Chu in view of Beitelmal teach the limitations of claim 38 as per above and further teaches that the air circulation fans (622) are matched to a space between adjacent boards but fails to specifically teach or suggest that the boards are mounted horizontally on shelves of the rack structure as claimed. The Examiner hereby takes Official Notice of the conventionality of mounting boards with or without

Art Unit: 2835

containers (12/13 as per Chu) on shelves within a rack structure. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings as per the Official Notice above with that of Chu and Beitelmal since shelving provides support and structural integrity to the rack of Chu.

With respect to claim 43, Chu teaches a system for cooling electronic components, comprising: a computer rack (200/600), each computer rack including: a frame structure (610/620) defining a plurality of spaces and part of the computer rack of has an open front (Having a cover 634) and back (Having a cover 630) sides that are adjacent lateral sides, the front and back sides open to circulation of ambient air from a computing facility within which the rows of computer racks are located during operation of the system, and the lateral sides not open to circulation of ambient air from the computing facility (See Fig 6b where the sides of the rack are shown as walls which are closed), a plurality of computer boards holding computing components and mounted in the frame structure, wherein the plurality of computer boards are accessible through at least one of the open front and back sides of the rack through the aisle during cooling of the computer components by air cooled through one or more cooling coils (640a-h); a plurality of fans (622) circulating air over the plurality of computer boards, each fan associated with a computer board; one or more cooling coils (620a-h) arranged to cool air from the plurality of fans, wherein the cooled air is circulated over a first computer board to an exterior of the frame structure separately from the cooled air circulated over a second computer board adjacent the first computer board (Each fan is dedicated to a single board as shown in Figs 6a-b). Chu fails to teach or suggest a fan controller

Art Unit: 2835

corresponding to each air circulation fan to control the speed of the corresponding fan according to a temperature sensed around a board corresponding to the air circulation fan and that the rack structure is one of a plurality of rack structures arranged to form a pair of rows on each side of a central aisle, the plurality of computer boards accessible through at least one of the open first and second sides through the central aisle.

Beitelmal teaches a fan controller(s) (50) corresponding to an air circulation fan(s) (14) to control the speed of the corresponding fan according to a temperature sensed around a board corresponding to the air circulation fan [0031, 0033]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Beitelmal as per above with that of Chu to provide the ability to increase or decrease the flow rate of cooling fluid [0033]. Increasing or decreasing the fluid rate will allow for more efficient cooling of the electronics. With respect to the aisle limitation, Dearborn teaches (In Fig 5) a plurality of rack structures (150a, 150b) arranged to form a pair of rows on each side of a central aisle, a plurality of computer boards accessible through at least one of the open first and second sides through the central aisle (See Fig 5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Dearborn with that of Chu, such that there are multiple racks (As the one shown in Chu Fig 11b) located in a pair to form a central aisle and wherein the boards are accessible via the aisle since doing so will, predictably, provide for a single data center with adequate room to maintain and cool the racks.

With respect to claim 44, Chu further teaches that the open back side of each frame structure is adjacent an exterior wall of a container (Room) that holds the rows of computer racks and the one or more cooling coils (6401-h) located between the open back side and the exterior wall of the container (See Fig 6b which shows cooling coil 640b just outside of the frame structure which would then be between the open back side and an exterior wall of the container (I.E. room holding the racks)).

With respect to claim 45, Chu further teaches that the racks extend substantially the length of the container (See Figs 6a-6b).

With respect to method claims 49-50, 52, the method steps recited in the claims are inherently necessitated by the device structure as taught by the Chu, Beitelmal, and Dearborn references as per the rejections above.

5. Claims 37, 46, and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn and further in view of Rumbut, Jr. (US 5,740,018 – hereinafter, “Rumbut”)

With respect to claims 37 and 46, Chu in view of Beitelmal and Dearborn teach the limitations of claims 36 and 43 as per above but fails to teach or suggest the limitations of claims 37 or 46. Rumbut teaches a cooling module (250) outside of a container (200) which fluidly connects to cooling coils. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Rumbut as per above with that of Chu to provide a device which will

Art Unit: 2835

remove heat from the fluid and thus allow the heat to be moved from the rack structure to an external area.

With respect to method claim 51, the method steps recited in the claims are inherently necessitated by the device structure as taught by the Chu, Beitelmal, Dearborn and Rumbut references as per the rejection above.

6. Claims 41 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn and further in view of Laffranchi (US 3,889,746).

With respect to claims 41 and 47, Chu in view of Beitelmal and Dearborn teach the limitations of claims 34 and 43 as per above but fails to teach or suggest the limitations of claims 41 or 47. Laffranchi, however, teaches one or more cooling coils include coolant conduits having an external member and an inner baffle defining an annular channel therebetween and through which a cooling liquid flows (See, Abstract). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Laffranchi with that of Chu, Beitelmal and Dearborn to provide for a smooth continuation of flow in the pipe line (Col 1, Line 67 – Col 2, Line 1).

7. Claims 42, 48 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn and further in view of Etter (US 6,407,567).

Art Unit: 2835

With respect to claims 42 and 48, Chu in view of Beitelmal and Dearborn teach the limitations of claims 34 and 43 as per above but fails to teach or suggest the limitations of claims 42 and 48. Etter, however, teaches individually controlling fans to provide the appropriate air flow rate for an individual heat generating device (Col 3, Lines 28-33). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Etter with that of Chu, Beitelmal and Dearborn to provide for a more efficient cooling apparatus (I.E. having fans provide only enough airflow that is necessary reduces power consumption).

With respect to method claims 55, the method steps recited in the claims are inherently necessitated by the device structure as taught by the Chu, Beitelmal and Etter references as per the rejection above.

8. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn and further in view of Takahashi et al. (US 6,530,347 - hereinafter, "Takahashi").

With respect to claim 53, Chu in view of Beitelmal and Dearborn teaches the limitations of claim 48 as per the rejection above and Beitelmal further teaches the conventionality of having a valve (42) which controls a fluid flow. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Beitelmal as per above with that of Chu to provide for a means to control the fluid flow through the coils of Chu.

Art Unit: 2835

With respect to the remaining limitations of claim 53, Chu in view of Beitelmal fails to teach or suggest the remaining limitations. Takahashi, however, teaches modulating a cooling liquid to the cooling coils through a valve; and controlling the valve according to at least one of a temperature and a pressure of the cooling fluid (Col 8, Lines 18-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Takahashi with that of Chu, Beitelmal, and Dearborn to prevent damage to the electrical components by assuring that there is enough coolant at the proper temperature to provide adequate cooling (Takahashi, Col 1, Lines 30-33).

9. Claim 54 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn in view of Takahashi and further in view of Laffranchi.

With respect to claim 54, Chu, Beitelmal, Dearborn and Takahashi all teach the limitations of claim 52 as per above but fail to teach the limitations of claim 54.

Laffranchi teaches the limitations of claim 53 as per the rejection to claims 41 and 46. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Laffranchi with that of Chu, Beitelmal, Dearborn and Takahashi to provide for a smooth continuation of flow in the pipe line (Col 1, Line 67 – Col 2, Line 1).

Art Unit: 2835

10. Claim 56 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chu in view of Beitelmal in view of Dearborn and further in view of Patel et al. (US 2003/0147214 – hereinafter, “Patel”).

With respect to claim 56, Chu in view of Beitelmal and Dearborn teaches the limitations of claim 34 as per above but fails to specifically teach or suggest the limitations of claim 56. Patel, however, teaches a controller (90) used to regulate both a valve (which supplies liquid coolant to cool an electronic device) and a fan (see [0029] and [0056]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Patel with that of Chu, Beitelmal and Dearborn to provide optimized cooling and efficiency of the cooling system of Chu (see Patel [0056]).

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 2835

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ZACHARY M. PAPE whose telephone number is (571)272-2201. The examiner can normally be reached on Mon.- Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jayprakash Gandhi can be reached on 571-272-3740. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Zachary M Pape/
Primary Examiner, Art Unit 2835